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Support Document
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for the Proposed Air Operating Permit Issued to

Kaiser Aluminum & Chemical Corporation
Tacoma Works
3400 Taylor Way
Tacoma, Washington 98421

State of Washington
DEPARTMENT OF ECOLOGY
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Introduction

This Operating Permit Support Document fulfills the operating permit rule "Statement of Basis" requirement and explains particular portions of the air operating permit for the Kaiser Aluminum & Chemical Corporation located in Tacoma, Washington.

This document is not part of the operating permit for Kaiser Aluminum & Chemical Corporation. Nothing in this document is enforceable against the permittee, unless otherwise made enforceable by permit or order.

Statement of Basis

When the Department of Ecology issues a draft operating permit, it is required to provide a statement that sets forth the legal and factual basis for the draft permit conditions, including references to the applicable statutory or regulatory provisions. [WAC 173-401-700(8).]

Facility and Process Descriptions

In June 2000, Kaiser temporarily halted smelting operations at its Tacoma smelter due to, among other things, high electricity prices. However, at full production, the Tacoma Works produces 81,000 tons per year of primary aluminum which is sold as either aluminum ingot sow or continuous cast rod. Approximately two-thirds of the metal produced is sold as rod and one-third is cast into ingots called "sows." Aluminum sow is either used by other Kaiser fabrication facilities, or it is sold domestically or shipped overseas. The major user of the continuous cast rod (CCR) is the wire and cable industry. The rod is drawn and stranded into a variety of different configurations to produce overhead transmission and distribution cable, or it can be insulated and used in underground cable. The CCR is also used in several special applications such as CATV cable, rod for deoxidizing molten steel, and as feedstock for the extrusion of small aluminum shapes.

The basic process for this reduction requires the electrolytic decomposition of alumina into the two chemical components (Hall-Heroult process) which are metallic aluminum and gaseous oxygen. In order to do this, alumina must be brought into a liquid form allowing the direct current to pass through it. The process uses a fluorinated compound of sodium and aluminum cryolite, which melts around 1000^{o}C, and which has the capability in the molten state to hold up to about 8% alumina in solution. Molten aluminum, which is released during the electrolysis, has a slightly higher specific gravity than molten cryolite at the cell operating temperature, and therefore will settle to the bottom of the cell. The electrolytic cell consists of a steel shell lined with insulating materials and having an electrically conductive bottom made of carbon connected to the negative polarity of the power source. Hanging above and dipping into the cryolite-alumina melt are monolithic carbon anodes connected to the positive polarity. When the electric current flows from the anode to the cathode, alumina is split into metallic aluminum which spreads over the cell bottom and into oxygen which evolves at the inner surface of the carbon anode, burning it and thereby releasing a blend of carbon dioxide and carbon monoxide gases. Fluoride gases also evolve from the bath due to the operating temperatures of the cells.

There are two basic cell designs, prebake and Soderberg. The Tacoma smelter is a horizontal-stud Soderberg (HSS) cell design. In Soderberg cells, the carbon anode paste (approximately 74 percent petroleum coke and 26 percent coal tar pitch) is placed into a steel casing hanging above the cell. The carbon paste is baked or calcined in the steel casing into one large anode by virtue of the heat of the molten bath and aluminum metal. Metal studs protruding into the monolithic anode hold the anode and bring the current into the cell. Kaiser's Tacoma Works has 400 Soderberg cells.

Air pollution control is an essential part of operating a primary aluminum smelter due to the large amount of air pollution generated. Air pollution control systems employed at Kaiser include the following:

> For potlines, a primary emission control system captures pot fumes. The system consists of an enclosure around each pot with a system of side and end doors, a system of ducts and fans which draw the fumes from each pot to a centralized treatment system. The treatment system consists of alumina dry scrubbers which uses a fluidized bed of alumina to scrub and adsorb the gaseous hydrogen fluoride from the gas stream. The resulting "reacted" alumina is removed, along with other particulate matter, by a system of baghouses prior to venting the treated gasses to the atmosphere. Kaiser has a total of 36 dry scrubber units for their potroom primary air pollution control system. Each dry scrubber unit has four stacks. Each stack has a flow rate of 8330 acfm at 160^{o}F The fans are located on the dirty side of the control system.
>
> In the paste plant, petroleum coke and coal tar pitch are heated, mixed and pressed into briquettes. Carbon particles and organic vapors escape these processes. For Kaiser's paste plant a high efficiency air filtration (HEAF) unit collects and treats organic vapors and particulates from pick-up points in the paste plant. The HEAF unit filters particulate material onto an advancing woven fiberglass fabric mat.
>
> Several ancillary processes in the plant are equipped with nuisance dust collectors.

While the air pollution control devices remove a very significant amount of pollutants, ninety percent of plant emissions are a direct function of operation and maintenance of the pots and the pots' enclosure system. Pollutants not captured by the primary emission system are released without treatment through roof vents to the atmoshpere. Accordingly, Kaiser's workforce and the maintenance and repair activities associated with pot doors has a direct affect on the amount of air pollutants emitted from Kaiser.

At the end of this document, in Appendix A are three graphs of Kaiser's emission trends over the past few years. As can be seen, the variability and averages of particulate matter (PM) emissions have changed three different times over this time period (approximately January 1992 to July 1995, August 1995 to July 1997, and August 1997 to December 1999). Total fluoride emissions have increased from 1.8 pounds of total fluoride per ton of aluminum produced to 3.0 pounds of total fluoride per ton of aluminum produced over this same time period, while gaseous fluoride emissions have doubled from approximately 0.60 pounds of gaseous fluoride per ton of aluminum produced to 1.4 pounds of gaseous fluoride per ton of aluminum produced.

Kaiser's compliance history related to air emissions is presented in the following table:

Emission Standard	Violation	Date of Violation	Docket No.	Enforcement Response
WAC 173-415-030(2)	19.4 lb PM/ton > 15.0	1/90	90-I013	$7750
WAC 173-415-030(2)	15.9 lb PM/ton > 15.0	10/91	92AQ-I024	$7750
WAC 173-415-030(2)	16.0 lb PM/ton > 15.0	2/95	95AQ-I030	$9800
WAC 173-415-030(6)	Open Pot Doors	1/97	97AQ-I036	$3000
WAC 173-415-030(2)	18.0 lb PM/ton > 15.0	12/98	99AQ-I010	$37,200
WAC 173-415-030(2)	17.9 lb PM/ton > 15.0	2/99	99AQ-I015	$48,048
WAC 173-415-030(6)	Hole in HEAF Fabric	10/99	99AQIS-114	Order
WAC 173-415-030(6)	Hole in HEAF Fabric	10/99	99AQIS-115	$4000

As can be seen in the above table, most of Kaiser's violations relate to exceedences of the potline emission standard. Many violations have not been recorded at other units, primarily because of the relatively small size of other units compared to the potline's emissions and because of the lack of emission testing at non-potline units.

Comments on Specific Permit Conditions

This section primarily describes decisions that were made when "gapfilling" was needed for applicable requirements that didn't specify monitoring methods or the monitoring frequency. This section also identifies applicable requirements that have been previously satisfied by the permittee. The following comments on specific permit conditions could have been organized multiple ways, for example, by emission unit or by applicable requirement. However, for relative brevity and clarity in this support document, the order followed in these "Comments of Specific Permit Conditions" parallels when the reader comes across an applicable requirement for the first time the permit. For the numerous times that an applicable requirement subsequently applies to a different emission unit, the reader will have already seen the discussion for that applicable requirement.

A) Opacity Permit Conditions (1.a), Fugitive Emissions (1.c), and Fugitive Dust (1.h):

All aluminum plants are required to meet the emission standards of WAC 173-415-030 and -060. WAC 173-415-030 states that “specific emission standards listed in this chapter will take precedence over the general emission standards of Chapter 173-400 WAC. The requirements of conditions 1.a (WAC 173-415-030(3)) and 1.c (WAC 173-415-030(4)), in this permit are at least as stringent as and take precedence over the requirements for visible emissions (WAC 173-400-040(1)) and fugitive emissions (WAC 173-400-040(3)(a)), respectively.

The permittee will be required to take corrective action any time visible emissions of any quantity are observed. This requirement may be more stringent and may provide more of an environmental benefit than requiring the permittee to conduct opacity readings because the permittee is required to take corrective action at any level of opacity, even opacity below the twenty percent limit contained in WAC 173-415-030(3). Consequently, the facility does not have to train and certify opacity readers and doesn't have to routinely observe and record multiple opacity readings. This approach is referred to as "see it, fix it." Ecology expects that the "see it, fix it" approach is an ongoing requirement but that once per week these inspections are documented in writing with the date, inspectors name and signed initials, and any observations.

The permit requires Kaiser to designate an individual or job position to conduct the inspections so that Ecology knows who is responsible and that Kaiser has provided training to look for visible emissions. This is required because too often Ecology has discovered a problem during a site visit but can find no responsible or knowledgeable facility personnel.

The "see it, fix it" approach also lends itself to application to fugitive emissions (WAC 173-415-040(3)) and fugitive dust (WAC 173-400-040(8)(a)) because conformity with these regulations is also driven by frequent observations and prompt repairs. Accordingly, permit conditions 1.c, fugitive emissions and 1.h, fugitive dust implement the find it fix it method.

There is a general relationship between visible emissions and grain loading that allows supports a surrogate measure compliance monitoring between the periodic grain loading reference testing. However, a specific correlation between visible emissions and grain loading has not been established that can translate a specific level of visible emissions to a quantity of particulate matter.. Accordingly, the "see it, fix it" approach provides a measure of continuous compliance for grain loading requirements subsequently discussed in section D) of this document and for permit conditions that contain "no visible emissions shall be present elsewhere in the system," discussed in section G) of this document.

B) Fallout (1.b), Odor (1.d), and Emissions Detrimental to Persons or Property (1.e):

Fallout, odor and emissions detrimental to persons or property, have not been a historical problem at Kaiser's Tacoma Works smelter. The problems for which these regulations apply occur when fallout, odor, or emissions detrimental impact Kaiser's neighbors. Notification of such problems is expected to come from complaints by those property owners or personnel off the plant site. However, the permittee's own employees may also make complaint. Accordingly, these permit conditions are complaint driven and requires the permittee to record any complaints received, assess the validity of the complaint and to take corrective action if the complaint is valid.

C) SO_2 Permit Conditions (1.f and 1.g):

All aluminum plants are required to meet the emission standards of WAC 173-415-030 and -060. WAC 173-415-030 states that "specific emission standards listed in this chapter will take precedence over the general emission standards of Chapter 173-400 WAC. The requirements of condition 1.f (WAC 173-415-030(5)(a)) in this permit is at least as stringent as and takes precedence over the requirement for SO_2 (WAC 173-400 - 040(5)(b)).

WAC 173-415-030(5) limits sulfur dioxide emissions from aluminum smelters to 60 lb per ton of aluminum produced on a monthly maximum basis, and also limits emissions to no more than 1,000 ppm SO_2. Many smelters, including Kaiser's Tacoma Works, presently control SO_2 emissions by limiting sulfur content in the coke and pitch used in the anodes.

Using Kaiser's normal and usual operating conditions, Ecology determined that Kaiser is unlikely to violate the 1,000 ppm SO_2 standard, with the possible exception of an upset condition. This analysis is as follows:

> A conservative assumption is made in the mass balance evaluation that all sulfur converts to SO_2. In addition, aluminum production rates and sulfur contents representative of all raw materials consumed during the period of concern are used in the mass balance evaluation.
>
> Normal Air Flow Rate = 1,200,000 acfm
> Highest Production Rate = 228 tons Al/day
> SO_2 mass rate limit = 60 lb SO_2 /ton Al
> SO_2 concentration limit = 1000 ppm SO_2
>
> (228 tons Al/day)(60 lb/ton Al) = 2497 tons SO_2/year
>
> (2497 tons SO_2/year)(2000lb/ton)(year/8760 hours)(hour/60 min)(1/1.2 X 10^6 acfm)(lb-mole SO_2/64.07 lb SO_2)(385 ft^3 SO_2/ lb-mole SO_2)(10^6 parts/million parts) = 48 ppm of SO_2.

Because the calculated concentration at maximum aluminum production of 48 ppm SO_2 in the dry scrubbers is far beneath the 1000 ppm SO_2 limit, no routine monitoring for this standard is proposed for the permit other than that required for the mass emission limit of 60 pounds of SO_2 per ton of aluminum produced.

The limit of 60 pounds of SO_2 per ton of aluminum produced, contained in WAC 173-415-030(5)(a), is based on an assumed carbon ratio of 0.5 pounds carbon to 1.0 pound aluminum and a three percent sulfur content in the coke material. Sulfur dioxide emissions will be calculated by a mass balance calculation, or, alternatively by source testing. The equation used for the mass balance calculation to determine the pounds of SO_2 per ton of aluminum produced limit is as follows:

$$\text{Pounds } SO_2/\text{ton Al} = (\Sigma C x S_C + \Sigma P x S_P + \Sigma O x S_O) \text{ x } 40/\text{Al}$$

> where C, P, and O are the coke, pitch, and fuel oil usage during the month from each shipment, in tons; S_C, S_P, and S_O are the sulfur concentration of each

shipment of coke, pitch or fuel oil respectively, expressed as a percentage; and Al is the aluminum production for the month. The factor of 40 derives from converting tons of raw materials to pounds (2,000 lbs/ton), converting the percentage of sulfur in raw materials to a decimal fraction (100), and converting the weight of sulfur to the weight of SO_2 (one pound of sulfur combines to make two pounds of SO_2).

For 1999, Kaiser's last full year of operation, Kaiser was typically at 2.8% sulfur and 47 pounds of SO_2 per ton of aluminum produced.

D) Grainloading Requirements for Non-potline Sources (conditions 1.1.i, 2.1.a, 2.2, 2.3.a, 3.3, 3.4, 3.5.a, 3.6 through 3.16, 4.2.b, 4.3, 4.4, 5.1, 5.2, 5.3.a, 6.1 and 6.2):

WAC 173-400-060 limits emissions of particulate matter to no more than 0.1 grains per dry standard cubic foot of exhaust gas. This regulation does not specify a testing frequency for this standard. This generally applicable requirement applies to conditions 1.1.i, 2.2, 2.3.a, 3.3, 3.4, 3.6 through 3.16, 4.2.b, 4.3, 4.4, 5.1, 5.2, 6.1 and 6.2.

Conditions 2.1.a, 3.5.a and 5.3.a are subject to a more restrictive limit of 0.005 grains per dry standard cubic foot of exhaust gas. These three, more restrictive grain loading conditions were established under administrative orders issued by Ecology and are federally enforceable.

Ecology considered the following criteria to help arrive at appropriate periodic monitoring:

1. <u>Likelihood of violating the applicable requirement (i.e. margin of compliance)</u>: Baghouses, if properly operated & maintained, should consistently emit low (< 0.005 grains/dry standard cubic foot) grain loading concentrations and the likelihood of violation is low. While Kaiser has extensive testing on their potline primary scrubbing system, Kaiser has few, if any source tests of these ancillary units.

   Ecology has issued numerous enforcement actions to this facility, many based on poor operation and maintenance (see preceding compliance history table). Additionally, Kaiser has not always been timely in detecting and correcting problems associated with ancillary dust collectors. Kaiser's record in repairing observed and documented uncontrolled emissions is another factor. One recent example demonstrates this: the pitch weigh tank vent took Kaiser over one year to remedy since it was first documented in an air inspection in January 1997 and again in August 1998. During those times Kaiser indicated that they would take care of this problem. However, during an Ecology inspection in June 1999 these emissions were again observed from the same source and problem. Observations by Ecology of visible emissions from the rod mill de-mister also support the permit conditions.

2. <u>Whether add-on controls are necessary for the unit to meet the emission limit</u>: Insufficient information is available to definitively make this determination.

However, Ecology believes that many of these processes without air pollution control devices (baghouses) would likely exceed the 0.1 grains/dscf limit. Conditions 2.1.a, 3.5.a and 5.3.a are subject to a more restrictive limit of 0.005 grains/dscf of exhaust gas. Add-on controls are needed to achieve this more restrictive particulate matter limit. With frequent inspections, visual checks, and inspection of equipment, there is a greater likelihood than with infrequent source testing that problems would be rapidly detected and corrected.

3. Variability of emissions from the unit over time: Source test data from the potline dry scrubbers indicates that while the emission values of these relatively highly maintained units are low, there can be two orders of magnitude difference between identical scrubbers. Accordingly, ancillary and supporting process units which aren't on the same intensive oversight program as the potline primary air pollution control system, would be expected to have a higher degree of variability.

   Kaiser's recent emission trend is another indication of emission variability (see Appendix A). From 1993 to 1999 Kaiser's emissions of total fluoride and gaseous fluoride have more than doubled on a pounds of pollutant per ton of aluminum produced basis

4. The type of monitoring, process, maintenance, or control equipment data already available for the emission unit: Kaiser, does not currently inspect the units for pressure drop, visible emissions (VE) or any anomalies. Kaiser will be required to make observations for VE, and any observed VE at any quantity would require investigation and, if necessary, correction.

5. Technical and economic considerations associated with the range of possible monitoring methods:
   - Routine source testing of these units would add, on average, an additional ten source tests per year to the more than 110+ source tests per year that Kaiser normally conducts.
   - Source testing would produce compliance data points from which to develop parametric monitoring or other surrogates so that a correlation could be developed.
   - Once the technology is installed, the primary regulatory concern is to assure good operation and maintenance practices associated with good air pollution control practices. This is addressed by routine source testing and by parametric monitoring developed in conjunction with source testing.

6. The kind of monitoring found on similar emission units: Ecology evaluated similar units at other types of sources such as plywood and pulp mills. Due to the differences in materials and processing these comparisons were not useful.

7. Potential for environmental impact: Based upon air flow, the environmental impact from baghouses not directly associated with the potlines is relatively low. Total air flows from all of these units is less than two percent (approximately 100,000 acfm) of

the potlines (approximately 6,000,000 acfm) and dry scrubbers (approximately 1,200,000 acfm).

Considering all of the above criteria together Ecology concluded the most important factors for determining the source test schedule used in this permit are air flow of the emission unit and whether the emission unit was controlled or uncontrolled and, if controlled, what type of controls. The end result is that a baghouse controlled emission unit should be source tested once per year per approximately 20,000 cfm. A cyclone controlled emission unit should be source tested once per year per 2000 cfm. An uncontrolled emission unit should be source tested once per year per 200 cfm. (An emission unit is classified as an Insignificant Emission Unit (IEU) if it emits less than 0.75 tons of PM10 per year and is subject to generally applicable requirements). An emission unit operating 24 hrs/day, 7 days/week, 365 days per year, 0.75 tons PM10/year translates to 200 cfm at 0.1 grains/dscf. 0.1 grains/dscf is the federally enforceable limit for emission units not otherwise limited.

The source testing frequency is summarized in the table below. Each of the emission units subject to grainloading requirements is also subject to the 20% opacity requirement (discussed in item A above), with the exception of Conditions 2.1.a, 3.5.a, and 5.3.a, which are subject to a 5% opacity requirement:

SOURCE TESTING FREQUENCY FOR EMISSION UNITS SUBJECT TO A GRAINLOADING LIMIT		
Non-baghouse Units	Baghouses	Source Testing Frequency
+2,500 cfm	+25,000 cfm	1 test/6 months
1,000-2,500 cfm	10,000-25,000 cfm	1 test/year
200-1,000 cfm	2,000-10,000	1 test/2 years
-200 cfm	200-2,000	1 test/permit term

The grainloading conditions in this permit (conditions 1.i, 2.1.a, 2.2, 2.3.a, 3.3, 3.4, 3.5.a, 3.6 through 3.16, 4.2.b, 4.3, 4.4, 5.1, 5.2, 5.3.a, 6.1 and 6.2), require the permittee to comply with grainloading limits and to conduct source testing (EPA Method 5 or 17) at defined intervals.

Ecology considered using a visible emissions observation as a surrogate for particulate matter source testing. However, Kaiser has no data to show a correlation between visible emissions and particulate matter emissions. Therefore Ecology has also required in this permit that Kaiser conducts visible emission observations during particulate matter source tests at non-potline baghouses with a particulate limit of 0.1 grains per dry standard cubic foot of exhaust gas. This requirement is contained in conditions 2.2, 2.3.a, 3.3, 3.4, 3.6 through 3.16, 4.2.b, 4.3, 4.4, 5.1, 5.2, 6.1 and 6.2.

Nonetheless, as discussed in section A) of this document, complying with the weekly "see it, fix it" inspection of permit condition 1.1.a. will provide a measure of compliance between the periodic particulate matter source tests source tests required by the permit. In Ecology's experience, a properly operated and maintained baghouse should easily be able to achieve no visible emissions. Therefore, this approach is appropriate for Conditions 2.1.a, 3.5.a, and 5.3.a as well as the other units regulated at 0.1 gr/dscf and 20% opacity. After Kaiser has completed the study described in the preceding paragraph, Ecology will better know the relationship between visible emissions and particulate matter.

E) Grainloading Requirements for Potline Sources:

Particulate matter is emitted from potline operations by both the uncontrolled potroom roof vents and the potline dry scrubbers. Potline operations are also covered by a separate, more specific particulate matter standard contained in WAC 173-415-030(2). This regulation limits the emissions of particulate matter from the reduction process (potlines) to no more than 15 pounds of particulate matter per ton of aluminum produced. Potline particulate emissions are determined by a series of monthly emission testing of EPA Reference Method 14 roof monitor system in Lines I, II and IV potroom roof vents and from representative primary control device reactors and stacks. A single monthly result is then calculated to determine a total potline emission rate for the month

Historical emission testing for the potline particulate emission standard has demonstrated that concentrations of particulate emissions from both the potline roof vents and the primary control system are orders of magnitude less than the 0.1 grains per dry standard cubic foot contained in WAC 173-400-060. Emissions from the time period January 1996 to August 1999 from the potline roof vents and primary control system are as follows:

	Line 2	Line 4	Dry Scrubbers
Average	0.0025	0.0024	0.0008
Median	0.0024	0.0024	0.0005
Mode	0.0021	0.0024	0.0003
Standard deviation	0.0005	0.0007	0.0012
Number of data points	148	152	148

Accordingly, there is little likelihood of violating the particulate matter concentration standard and, therefore, no specific testing for compliance with the emission standard for general process units contained in WAC 173-400-060 is explicitly required in the permit. Particulate matter source testing results collected pursuant to other permit requirements for the mass particulate limits in conditions 3.1.a, 3.1.b and 3.2.a and the corresponding reporting of these results, combined with the O&M provisions in condition 3.1.c and the VE monitoring in condition 1.1.a, will provide sufficient compliance data for the particulate matter concentration requirement contained in WAC 173-400-060 for potroom roof emissions and from the primary control system.

F) Ambient and Forage Fluoride Standards and Monitoring (1.j – 1.m):

Order No. DE 98AQ-I024, First Amendment, describes prior monitoring and modeling of ambient and forage fluoride near the plant. This order was issued under WAC 173-415-060 WAC, not from a new source review order, and is not federally enforceable. Based on the findings stated in the order, monitoring for gaseous ambient fluoride standards is not needed. Based on a possibility that forage standards could be exceeded, forage monitoring was required through 2001, after 2001 forage monitoring is determined on Kaiser's performance during 1999, 2000 and 2001. However, Kaiser ceased operations prior to completion of their forage monitoring but will be required to conduct sampling and testing for the missing period of time after their start-up.

G) "No visible emissions present elsewhere in the system" (2.1.c, 3.5.c, and 5.3.c):

Many existing Notice of Construction orders included a requirement the "no visible emissions be present elsewhere in the system." The intent of this requirement was that, during installation of a new source or modification, the permittee give some thought to air pollution control improvements beyond the dust collector, to needed hoods, shields, doors, etc. And that once constructed, the new or modified sources should receive some level of attention such these air pollution control improvements be maintained. Compliance with permit condition 1.1.a will provide sufficient data to demonstrate compliance with this condition.

H) Potroom Operation & Maintenance (3.1.c):

Operation and maintenance of processes and emission controls, in a manner consistent with good air pollution control practice, is a very substantial and consequential applicable requirement. As has been pointed out, over ninety percent of a potline's emissions come from the potroom roof vents. These emissions are a direct result of the quality of Kaiser's operation and maintenance activities in the potrooms. These operation and maintenance activities affect both gaseous emissions such as gaseous/hydrogen fluoride and particulate emissions.

Proper operation and maintenance encompasses many qualitative areas ranging from pot door condition and placement to ore station leakage to general housekeeping. Pot door condition and placement are a primary concern but not the only concern of good air pollution control practice.

For the purposes of the Air Operating Permit, potroom monitoring for WAC 173-415-030(6) focuses on worker training and weekly inspections. Kaiser will be required to conduct an annual training program in operation and maintenance practices, consistent with good air pollution control practice, for its employees. Teaching employees the environmental repercussions of their actions is a means to build awareness and annual training is a means to refresh the effect their actions have on the environment. The permit will also require Kaiser to conduct weekly inspections to reinforce the training and to evaluate the quality of the training. The intent of the weekly inspections is to assess, for example, how well Kaiser is maintaining the pot doors in good repair, how well workers are minimizing the number of unnecessarily open doors, or how well work practices are minimizing emissions.

I) Collection and Removal Efficiency (3.1.d):

WAC 173-415-030(1)(b) requires potline primary emission control systems to be "designed so that the control of fluoride emissions will be equivalent to a total fluoride collection efficiency of eighty-five percent for horizontal stud Soderberg pots. A primary emission control system with a design removal efficiency of at least ninety-five percent of the fluoride collected is required."

Hooding efficiency is a valuable measurement of environmental performance. Over ninety percent of a primary aluminum smelter's emissions come from the potroom roofs and is in large part due to emissions escaping the pot's emission collection system. Accordingly, particulate and gaseous emissions of pollutants from the potrooms are largely a function of hooding efficiency. Improved hooding efficiency has a direct effect on reducing emissions to the atmosphere by at least 100-fold (e.g. one pound of gaseous fluoride emitted to the roof that is instead collected and routed to the dry scrubbers is reduced conservatively by over 99.0%. Therefore, instead of one pound being emitted to the atmosphere only 0.01 pounds of gaseous fluoride would be emitted, a minimum of a 100-fold decrease in emissions).

Kaiser's MACT strategy demonstrates the key importance of hooding efficiency as an emission control and minimization strategy. The following paragraph from page 3 of Kaiser's July 21, 1998 letter to Ecology highlights Kaiser's heavy reliance on projects to improve collection efficiency for a MACT strategy:

> Based upon the data collected from the above referenced investigations and measurements, it became clear that in order to sustain long term compliance with the MACT standards for potlines that a two pronged approach was needed. The first element of the approach was determined to be increased cell ventilation rates so that cells would be operating in a range on the collection efficiency curve that is essentially flat. As a result, the collection efficiency would be unaffected by normal air flow rate variability. (Normal variability results from pitch condensate that is routinely removed as well as the accuracy of pitot tube measurements). The second element of the approach was determined to be a more readily maintainable pot sealing system so that the degradation of the sealing system from normal wear and tear would not cause the collection efficiency to drop off as rapidly given the variability in airflow rates.
>
> Thus, these two elements have the combined effect of allowing cells to operate on a flat portion of their collection efficiency curve and to have its "family of curves" from wear and tear over a narrower range.

In a September 13, 1999 letter to Ecology, Kaiser indicated that improvements to pot door sealing, namely installing top and bottom door seals; and increasing pot air flows by approximately twenty percent through replacing conventional bags with pleated bags would, at the mean minus two standard deviations (approximately 95 percent confidence) increase air flow from 3015 acfm to 3618 acfm per pot. This would provide a corresponding improvement to collection efficiency of 77 percent to 85 percent. These values were determined through tests Kaiser conducted on pot 160 in Line IV.

WAC 173-415-030(1)(b) requires, on an ongoing basis, at least 85% collection efficiency, and separately, at least 95% removal efficiency. The treatment efficiency requirement is easily met by virtue of the dry alumina scrubbers. These systems are typically 99 % efficient even through periods of poor operation and maintenance. However, little is known about how well Kaiser meets the 85% collection efficiency standard as Kaiser has not tested or reported this information over the last decade.

This permit requires Kaiser to conduct periodic collection efficiency tests. Presently, Kaiser's Tacoma Works has EPA's reference method 14 monitoring systems on all three of their potlines making one of two components of the hooding efficiency measurements relatively easy. Kaiser will have to do MACT testing three times per month on each potline. The total fluoride testing for MACT will provide Kaiser with this component of hooding efficiency without any additional cost or effort. Regarding the inlet testing of the primary control system, frequency will be based upon Ecology's assumption that inlet variability is relatively lower than the roof emissions. Accordingly, testing will only be required once per month per line and that the three most recent inlet tests be used to calculate hooding efficiency. After twelve months of testing Kaiser may reduce the testing frequency or eliminate testing all together if Kaiser has a statistically significant margin of safety over the 85% standard. If Kaiser does not achieve the margin of safety, the testing frequency will not change.

J) Hazardous Air Pollutants and Primary Aluminum MACT (2.4 and 3.16)

In October, 1997, USEPA promulgated National Emission Standards for Hazardous Air Pollutants (NESHAPS) representing Maximum Achievable Control Technology (MACT) for the primary aluminum industry. These rules are contained in the Code of Federal Regulations at 40 CFR Part 63, Subpart LL. Hazardous air pollutants (HAPs) for this industry include hydrogen fluoride and polycyclic organic matter, (POM). The MACT standards for primary aluminum were further subcategorized into major process areas producing emissions of either or both of these HAPs including potlines, paste plants, and bake ovens, and for potlines, still further subcategorized by the type of reduction cell employed. Kaiser's Tacoma Works is categorized in the federal MACT regulations as being within the horizontal stud Soderberg (HSS) subcategory.

In HSS plants, potlines produce and emit fluoride in both gaseous and particulate form and also emit polycyclic organic matter (POM). Total fluoride standards address both gaseous and particulate forms of fluoride. POMs are a concern in Soderberg plant potlines because they are driven off from the anode material as the green anode material is baked in place within each individual pot's shell or steel casing. MACT standards for HSS potlines address both total fluoride and POMs. Paste production plants produce POM emissions but fluoride emissions are not significant. Incoming coal tar pitch, used as the binder for coke in the manufacture of anode briquettes, contains substantial quantities of polycyclic aromatic hydrocarbons which escape during the melting, mixing and pressing processes within the carbon plant. MACT standards for paste plants require a specific technology for POM emission control - dry coke scrubbers, although other technologies may be used if equivalency is demonstrated. On September 10, 1999, Kaiser submitted a request for their high efficiency air filtration unit as an alternative control device for polycyclic organic matter at their paste plant (40 CFR 63.843(b)(3)). On October 27, 1999 the Environmental Protection Agency's Region 10 approved Kaiser's alternative control device at the paste plant. Therefore, Kaiser has demonstrated compliance with 40 CFR 63.843(b). This approval required the submittal of an amended parametric monitoring plan for approval. The amended plan was submitted to EPA on February 20, 2000. EPA approved the amended plan on May 17, 2000. Numerical POM limits are not included in the standards although parametric monitoring is.

Kaiser's emissions have increased over the years and Kaiser requested and was granted a compliance extension from the MACT standards and requirements. The original initial MACT compliance deadline was October 7, 1999. EPA issued a compliance extension on July 25, 2000 to Kaiser's Tacoma Works. The extension expired on October 31, 2000 for potline 4 and on May 31, 2001 for potlines 1 and 2. Therefore, the terms and conditions of EPA's extension have not been included in the air operating permit.

On September 2, 1999 Kaiser submitted a site specific test plan to EPA's Region 10, as required by 40 CFR Part 63.7(c)(2)(i) and Part 63.847(b). As such, the requirements for submission of a site-specific test plan have been satisfied and are not included in the permit. On October 18, 1999, EPA's Region 10 gave Kaiser qualified approval of Kaiser's test plan. Specifically, EPA indicated that Kaiser should follow the compliance methods specified in the Primary Aluminum MACT rule and should refrain from using alternative methods until approved by EPA.

On September 2, 1999 Kaiser submitted a notification of an initial performance test for the potlines to EPA's Region 10, as required by 40 CFR Part 63.7(b)(1) and Part 63.850(a)(5). As such, these requirements have been satisfied and are not included in the permit. However, Kaiser received a compliance extension and has ceased operations prior to the compliance extension deadline. Accordingly, Kaiser has not yet submitted notification of initial compliance status as required by 40 CFR Part 63.7(g)(1) and Part 63.850(a)(6). Upon restart of the potlines, Kaiser will have 180 days to comply with this requirement. This requirement has been included in the permit.

K) Hazardous Air Pollutants and Secondary Aluminum MACT (4.5)

On March 23, 2000, the USEPA promulgated National Emission Standards for Hazardous Air Pollutants (NESHAPS) representing Maximum Achievable Control Technology (MACT) for the secondary aluminum industry. These rules are contained in the Code of Federal Regulations at 40 CFR Part 63, Subpart RR. Hazardous air pollutants (HAPs) for this industry include organic HAPs, inorganic gaseous HAPs (hydrogen chloride, hydrogen fluoride and chlorine) and particulate HAP metals. These MACT standards apply to secondary aluminum production facilities using clean charge, aluminum scrap, foundry returns or molten metal as the raw material and performing, among other things, one or more of the following processes: furnace operations such as melting, holding, refining, fluxing or alloying; in-line fluxing; or dross cooling.

Kaiser's permit includes those conditions that are applicable to existing group 1 and group 2 furnaces, in-line fluxers and secondary aluminum processing units. Requirements for affected sources that Kaiser does not have at their Tacoma smelter are not included in their permit. Kaiser must demonstrate compliance with the secondary MACT requirements by March 24, 2003, or within 180 days of restart, whichever is later.

L) WAC 173-400-105, WAC 173-401-530(2)(c), and Insignificant Emission Units

Since monitoring, recordkeeping, and reporting has not specifically been required by Ecology for insignificant emission units per WAC 173-400-105(First Paragraph), there are no air operating permit monitoring, recordkeeping, and reporting requirements for the insignificant emission units required by the permit. In the event that such monitoring, recordkeeping, and reporting requirements are imposed pursuant to WAC 173-400-105, an IEU would no longer qualify for the exemption from operating permit testing, monitoring, reporting or recordkeeping contained in WAC 173-401-530(2)(c). Further, WAC 173-401-530(2)(c) states that permits shall not require testing, monitoring, reporting or recordkeeping for IEUs except where generally-applicable requirements of the SIP specifically impose such requirements. At the time of permit issuance, there are no such requirements applicable to IEUs.

E) Numbering Sequence of Emission Units:

Kaiser's emission units (including insignificant emission units and activities (IEUs) and those subject to only the generally applicable requirements) are numbered in sequence in the permit application. The facility-wide generally applicable requirements apply to the whole facility, including IEUs. The air operating permit rule states, however, that IEUs are not subject to testing, monitoring, recordkeeping, reporting and compliance certification requirements unless the generally applicable requirements in the State Implementation Plan (SIP) impose them [WAC 173-401-530(2)]. The Washington SIP does not impose any specific testing, monitoring, recordkeeping, reporting or certification requirements for the generally applicable requirements for IEUs. Therefore, the permit does not include the IEUs in the respective process tables and does not require any testing, monitoring, reporting, recordkeeping, or compliance certification requirements for IEUs. Since all emission units in the facility are subject to the generally applicable requirements, only the emission units with additional requirements were included in the process tables.

To avoid confusion about why there are missing numbers in the emission unit numbering sequence, the sequence all of the emission units are summarized below.

The permittee is required to include emission units defined as insignificant on the basis of size or production rate in accordance with WAC 173-401-533. Those emission units are identified in the table below.

PROCESS	EMISSION UNITS INCLUDED IN THE PERMIT (SUBJECT TO SPECIFIC REQUIREMENTS IN ADDITION TO GENERALLY APPLICABLE REQUIREMENTS)	EMISSION UNITS SUBJECT TO ONLY GENERALLY APPLICABLE REQUIREMENTS	IEUs
Paste Plant	2.1 (Coke/Coal transfer baghouse	2.4 (Pitch heater stacks)	2.5 (IEU/vacuum cleaner)
	2.2 (Material preparation baghouse)	2.9 (Tank vents)	2.6 (IEU/4 roof vents)
	2.3 (Pitch fume collection system)		2.7 (IEU)/3 roof vents)
			2.8 (IEU/fugitive area)
			2.10 (IEU/Old boiler building vents)
Potroom Operations	Combined emissions from 3..1 (dry scrubber baghouses) and 3.2 (roof vent monitors)	3.3 (L1 Anode vacuum baghouse)	
	3.1 (Dry scrubber baghouses)	3.4 (L2 Anode vacuum baghouse)	
	3.2(Roof vent monitors)	3.6(L1&2 Unloading baghouse)	3.17 is an IEU (Fugitive emissions from alumina unloading, maintenance and housekeeping)
	3.5 (L4 Anode vacuum baghouse)	3.7 through 3.16 (baghouses)	
	3.6-3.16 (baghouses)		
Metal Products	4.1 (Melting Furnace #1)	4.2 (Stack for aluminum melting furnace #2)	4.4 (Emergency chlorine leak vent)
	4.6 (Rod forming stack mist eliminator)	4.3(Stack for aluminum holding furnace and degasser)	4.5 (Stack for bar caster)
	4.18 (Baghouse for cruce lid cleaning)		4.8 (Stack for gas-fired coolant heaters)
	4.19 (Baghouse for cruce cleaning)		4.9(Stack for steam cleaning room)
Ancillary Operations	5.8 (Baghouse for bath crushing and prebake anode cleaning)		5.1 (Lab annes duct for sample grinding)
	5.9 (Baghouse for superstructure cleaning)		5.2 (Duct for lab fume hood)
	5.13 (Stud cleaning dust collector)		5.3(Dust for atomic absorption spectrometer)
			5.4(Stack for fume hoods 1 &2)
			5.5 (Stack for gas-fired furnace)
			5.6(Vents for Lab/Technical building)
			5.7(Line IV channel building vents)
			5.10(Building 3 roof vents; spent pot digging /recycle& storage and cell relining fugitives)
			5.11 Fugitive emissions from bath and metal pad storage, air compressors and pot storage)

E) Numbering Sequence of Emission Units:

Kaiser's emission units (including insignificant emission units and activities (IEUs) and those subject to only the generally applicable requirements) are numbered in sequence in the permit application. The facility-wide generally applicable requirements apply to the whole facility, including IEUs. The air operating permit rule states, however, that IEUs are not subject to testing, monitoring, recordkeeping, reporting and compliance certification requirements unless the generally applicable requirements in the State Implementation Plan (SIP) impose them [WAC 173-401-530(2)]. The Washington SIP does not impose any specific testing, monitoring, recordkeeping, reporting or certification requirements for the generally applicable requirements for IEUs. Therefore, the permit does not include the IEUs in the respective process tables and does not require any testing, monitoring, reporting, recordkeeping, or compliance certification requirements for IEUs. Since all emission units in the facility are subject to the generally applicable requirements, only the emission units with additional requirements were included in the process tables.

To avoid confusion about why there are missing numbers in the emission unit numbering sequence, the sequence all of the emission units are summarized below.

The permittee is required to include emission units defined as insignificant on the basis of size or production rate in accordance with WAC 173-401-533. Those emission units are identified in the table below.

PROCESS	EMISSION UNITS INCLUDED IN THE PERMIT (SUBJECT TO SPECIFIC REQUIREMENTS IN ADDITION TO GENERALLY APPLICABLE REQUIREMENTS)	EMISSION UNITS SUBJECT TO ONLY GENERALLY APPLICABLE REQUIREMENTS	IEUs
			5.12 (Building 5 vents for pot door building, spent anode butt storage, and transfer fugitives, maintenance and housekeeping)
			5.14 (Stack for pot ramming)
			5.15(Service/casting building vents for stud handling fugitives and maintenance and housekeeping)
Maintenance Activities	6.9 (Dust collector for saws, drill press, and lathe)	6.17 (Tank vent for 15,000 gallon diesel storage tank by paste plant)	6.1 (Smoke and fume collection system for vehicle repair shop)
	6.13 (Baghouse for bag cleaning)		6.2 (Stack for forge)
			6.3(Fume collection, near vehicle repair shop, for welding fugitives)
			6.4(Fume collection, near potlining, for welding fugitives)
			6.5 (Stack for gas-fired furnace)
			6.6(Maintenance building vents for open welding fugitives, oil bath, gas-fired heater and hammer)
			6.7(Bag storage building vents)
			6.8(Stacks for gas heaters for carpenter shop)
			6.10 (Carpenter shop building vents for emissions generated by maintenance and housekeeping)
			6.11 (Stack for electric drying oven in the carpenter shop)
			6.12 (Storeroom building vents for emissions generated by maintenance
			6.14 (Vacuum system)
			6.15(Bag rehab building vents for bag rehab and precoating fugitives and maintenance)
			6.16(Fugitive emissions from battery maintenance, open welding, solvent tanks/parts degreasers, and steam cleaning)

Orders

Existing Orders

Kaiser's existing orders are listed below:

Order DE 87-233 (6/27/87)
Order DE 90-I084 (12/21/90)
Order DE 91-I035 (4/4/91)
Order DE 91-I055 (6/2/91)
Order DE 90-I084 (11/15/91)
Order DE 92AQ-I022 (1/23/92)
Order DE 92AQ-I022 (no date on the document)
Order DE 92AQ-I043 (4/17/92)
Order DE 92AQ-I043 (4/23/92)
Order DE 92AQ-I074 (6/12/92)
Order DE 92AQ-I084 (11/29/93)
Order DE 94AQ-I073 (9/29/94)
Order DE 94AQ-I073 (10/27/94)
Order DE 95AQ-I041 (7/21/95)
Order DE 90-I084 (2/23/95)
Order DE 95AQ-I012 (2/24/95)
Order DE 95AQ-I032 (5/18/95)
Order DE 95AQ-I041 (7/21/95)
Order DE 96AQ-I023 ()
Order DE 97AQ-I018 (3/10/97)

Consolidated Orders

Order No. DE 98–AQI020 amends the following orders:

Order DE 91-I055 (6/2/91)
Order DE 92AQ-I043 (4/17/92)
Order DE 95AQ-I041 (7/21/95)
Order DE 96AQ-I023 (4/25/96)
Order DE 97AQ-I018 (3/10/97)